User-Centered Development of a

Braking System For Manual Wheelchairs

Jonathan Jowers


NIDRR


mobilityRERC


Georgia Tech
College of Architecture


catea

Defining the problem by understanding the user.

Three categories of questions about

- Their chair
- Their function and how they propel
- Their perception of need

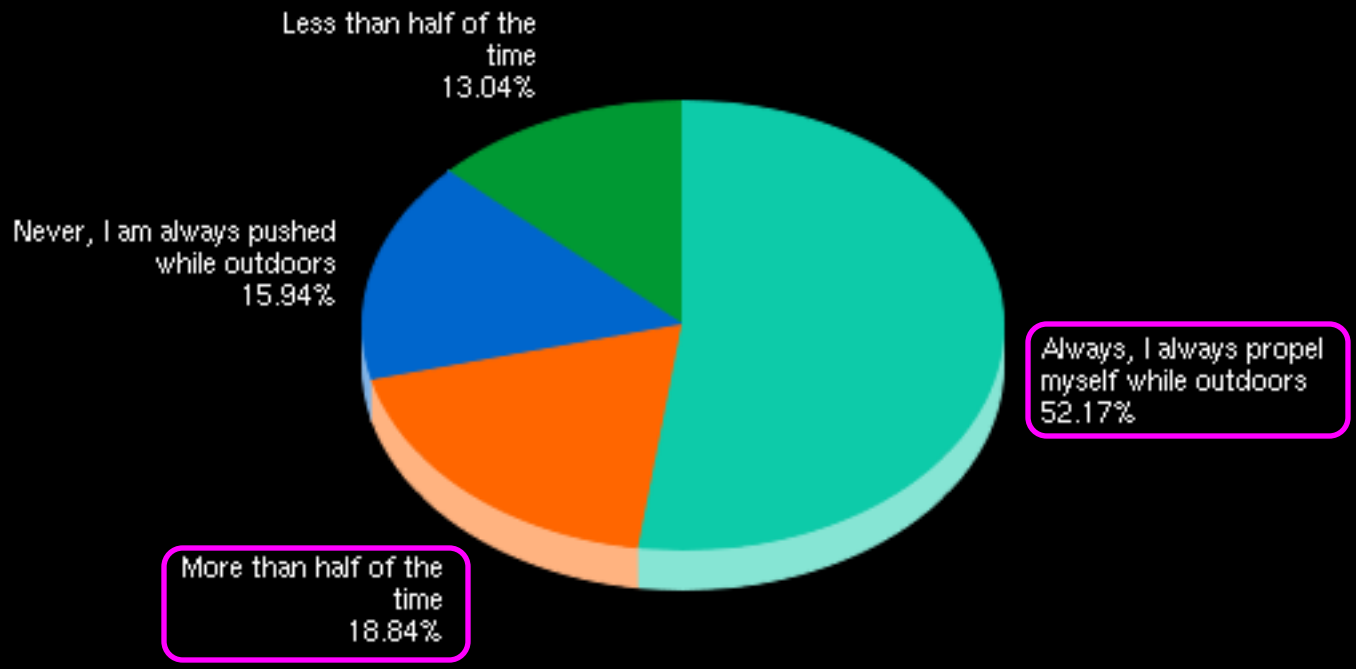
Three categories of questions about

Their chair

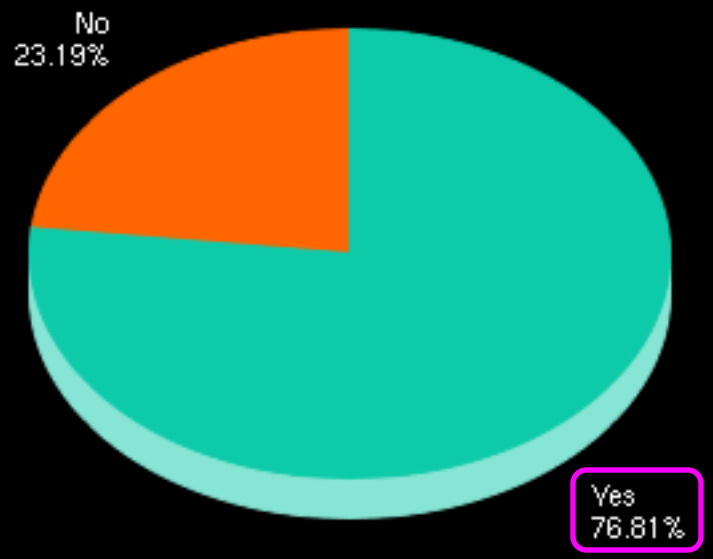
Their function and **how they propel**

Their perception of need

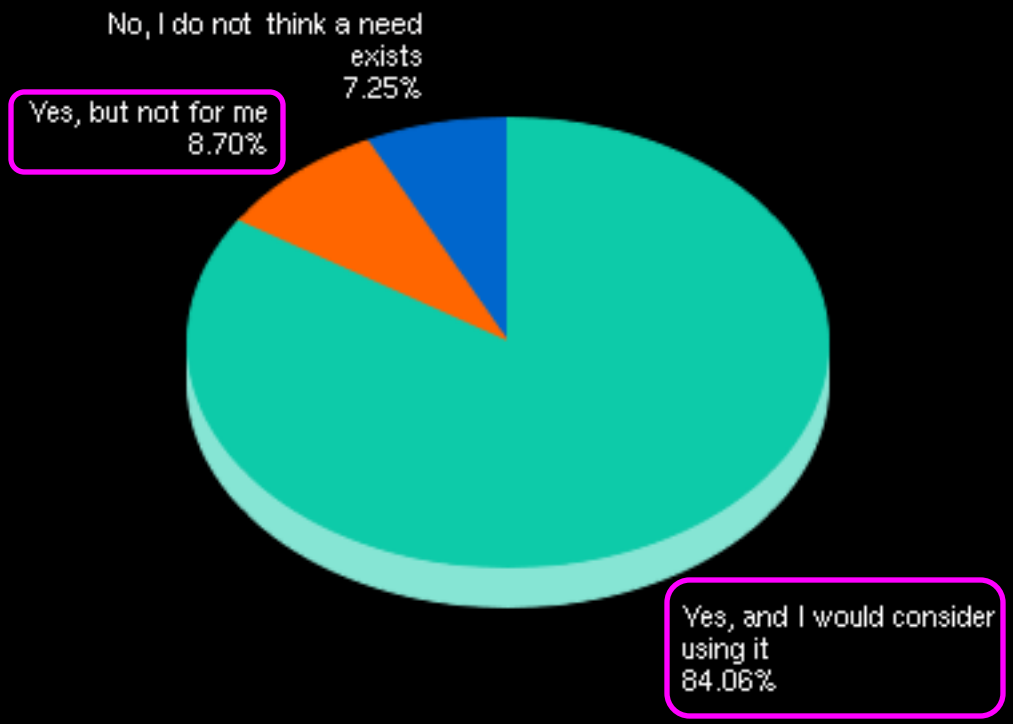
8. How often do you propel yourself while outdoors?



13. Have you ever felt loss of control of your wheelchair during or after going down a slope or ramp?



15. Do you feel that need exists for an improved braking system for manual wheelchairs?



Slowing down and maintaining control of a wheelchair can be difficult for some users; especially those with poor hand strength and/or sensation.

Ramps and slopes present a significant barrier to independent and safe mobility.

Collisions, falls and/or tips are consistent with running into an object at too high of speed.

A need exists for a braking system for manual wheelchair users that allows them to use their hands more effectively and efficiently while braking.

Designing based on user needs.

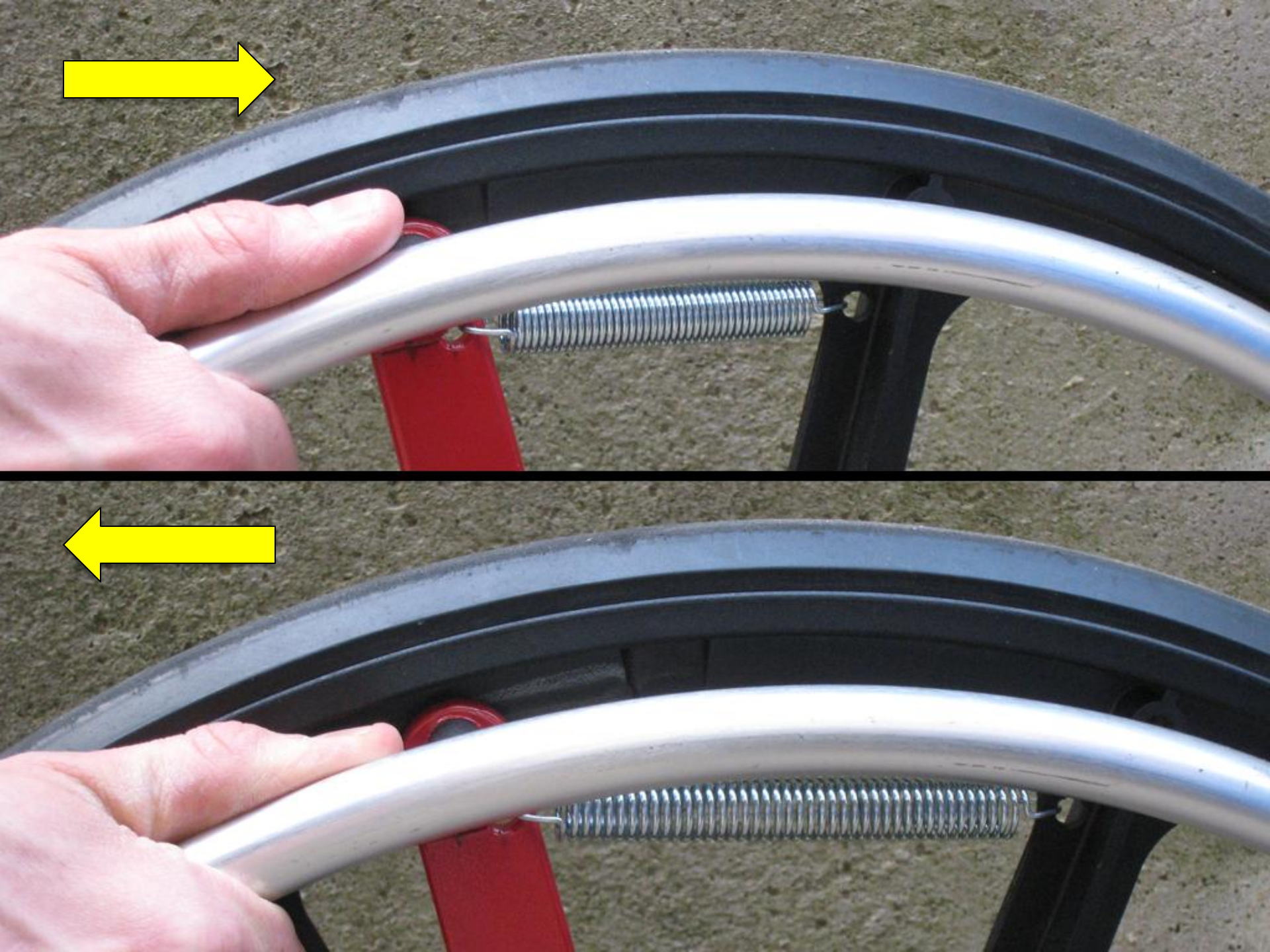
Physical device attributes

-repeatable and expected operation
-regular function of wheel chair
-no increase in overall width
-nominal increase in weight
-minimal addition/modification to the chair
-use standard brackets if attaching to frame
-no obtrusive levers, cables, or similar hardware

User function attributes

-“hands on device”
-normal propulsion
-independent operation
-normal operation of the wheelchair
-minimal user dexterity
-minimal grip strength
-minimal user force

The concept



Forwards

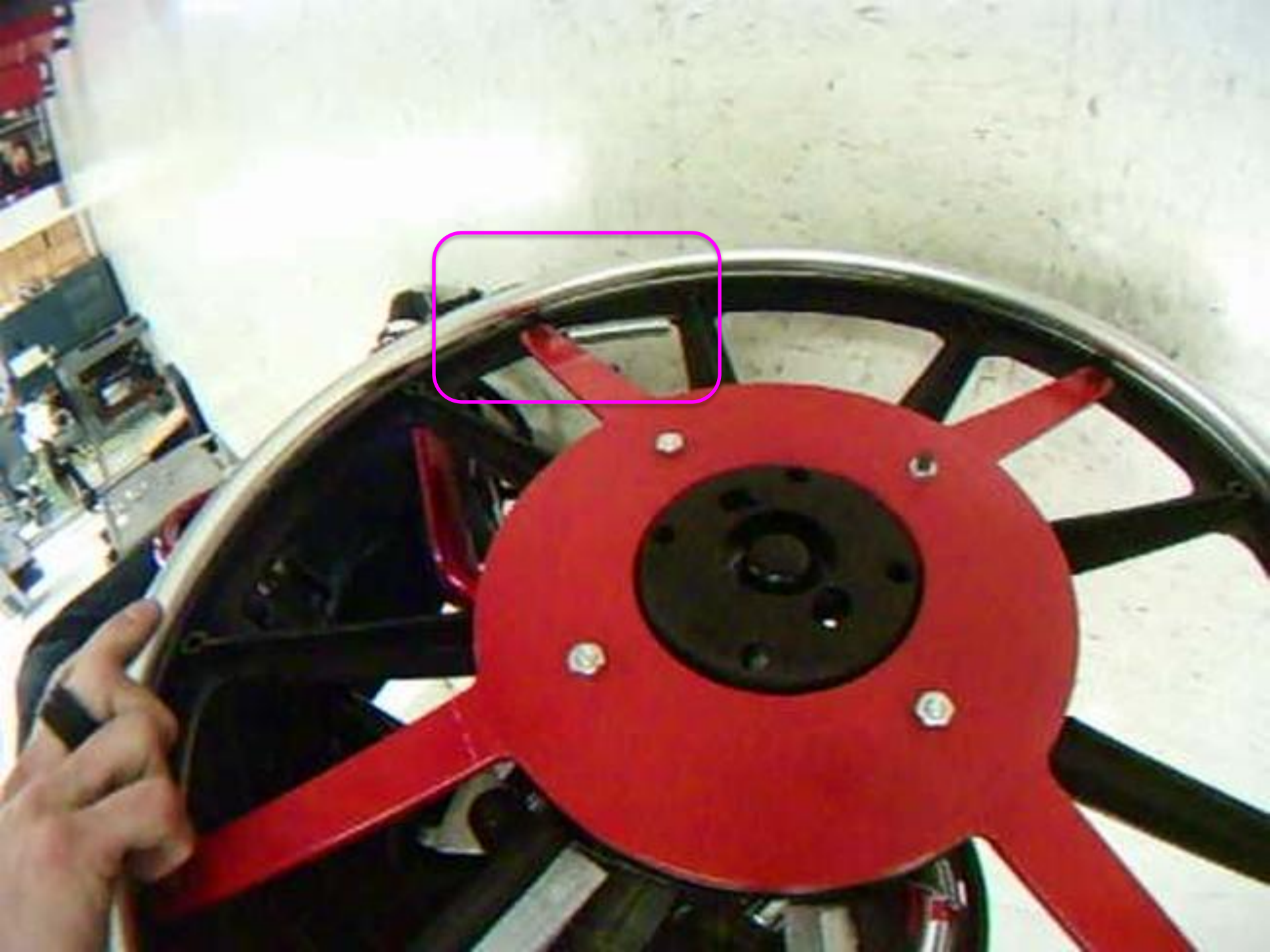
Positive stop between pushrim and wheel, pushrim remains static

Backwards

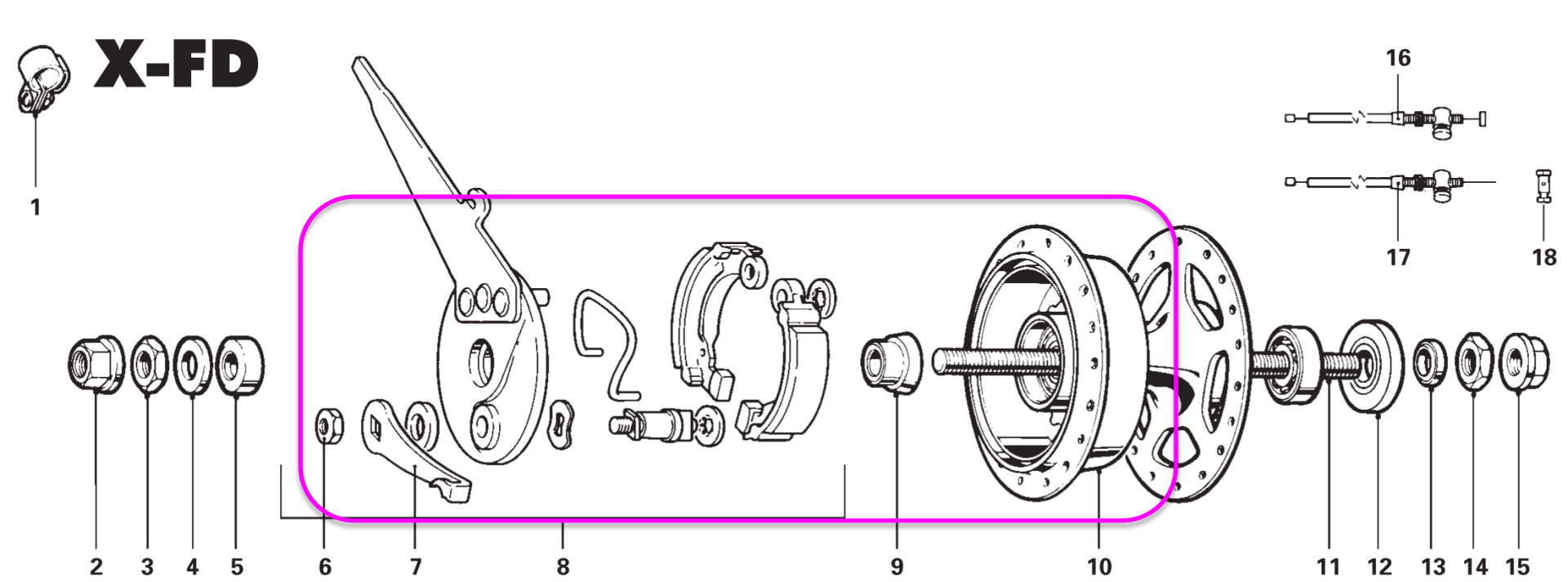
Spring force greater than applied force, pushrim remains static

Braking

Spring force less than applied force, pushrim becomes dynamic, engaging brake



X-FD




StimuLITE
Honeycomb Cushion
Supracor
Contoured
A-1

User testing

Next steps...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